dLAN® 200 AVpro2

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Preface

Thank you for placing your trust in this devolo product!

The dLAN 200 AVpro2 is a network device that uses power and coaxial cables which have already been installed in order to provide data communication for applications such as HDTV streaming, Internet telephony, and fast Internet connection. Once it has been installed successfully, the dLAN network behaves like a conventional LAN. The dLAN 200 AVpro supports a network speed of up to 200 Mbps and provides a powerful encryption function with maximum data security.

Exacting manufacturing standards and stringent quality control are the basis for high product standards and consistent quality to ensure your fullest satisfaction with this dLAN 200 AVpro2.

About this manual

After a brief introduction to "dLAN" basics in **Chapter 1**, **Chapter 2** will cover successfully setting up your dLAN 200 AVpro2. **Chapter 3** contains practical examples of the use of the dLAN 200 AVpro2. For safety notes, CE conformity and our warranty terms, see **Chapter 4**. Finally, **Chapter 5** contains troubleshooting tips.

For technical specifications, please see our **product sheet** on the included product CD.

Description of the symbols

Here we briefly describe the meaning of the symbols used in this manual.

Very important note. Failure to observe this note may result in damage.

Important note that should be observed.

Additional information, background material and configuration tips for your device.

And if you are satisfied with your dLAN 200 AVpro2, be sure to have a closer look at our other products which are also designed to make your connected lifestyle easier and simpler!

We hope you have just as much fun reading this manual as we had writing it. If you have any further ideas or suggestions related to our products, we would be delighted to hear from your at **support@devolo.com**!

devolo on the Internet

For detailed information on our products, please visit **www.devolo.com**. The download area not only contains product descriptions and documentation, but also updates of devolo software and your device's firmware.

We especially recommend the extensive devolo manuals on the topic of home networking that contain a wealth of interesting background information. These are available free of charge and can be downloaded from the **Service & Support** area of our website.

1 Introduction

In this chapter, we will provide an overview of the dLAN technology and introduce the dLAN 200 AVpro2 briefly.

1.1 What exactly is dLAN?

There is now an exciting new alternative to the familiar cable-based and wireless technologies, LAN and Wireless LAN: **dLAN** (**d**irect **L**ocal **A**rea **N**etwork, i.e. networked directly). dLAN uses power or coaxial cables that have already been installed to enable data communication.

Cost factor and transmission quality

dLAN is an economical and easy-to-use networking technology. Cables no longer need to be installed, and any socket or coaxial cable outlet can be used to connect to the network.

With dLAN, additional frequencies are modulated on the power and coaxial circuits. Modulation and demodulation is a well-known and proven method of data transmission, which has been in use in other applications for a number of years. Depending on the properties of the circuit and the damping factor, distances of 200 meters can be spanned with the power circuit; over 750 meters is possible over the coaxial circuit.

In order to transmit data over the power supply grid or the coaxial network, the dLAN 200 AVpro2 is used in conjunction with Standard HomePlug AV. HomePlug AV uses the domestic power or coaxial infrastructure to transmit data, audio and video in just the same way as the proven HomePlug 1.0 technology. But HomePlug AV is much faster: with a transmission rate of 200 Mbps and its "Quality of Service: functions, HomePlug AV technology is ideal for Triple-Play services, and is thus entirely capable of handling the enormous range of new online entertainment options.

HomePlug AV and HomePlug 1.0 can be operated together on the same power network. Data can be exchanged between HomePlug 1.0 networks and HomePlug AV networks via a bridge. One HomePlug 1.0 adapter and one HomePlug AV adapter simply have to be plugged into adjacent sockets and connected directly with an Ethernet cable.

Data security and radiation

The dLAN 200 AVpro2 devices are protected with "AESpro 128". This is a combination of "128-bit triple AES encryption" (Advanced Encryption Standard) and a time lock when entering a new password. This procedure represents reliable protection for your dLAN network against unauthorized access. Two modes of attack would be conceivable, but both will fail thanks to the AESpro encryption. In order to find the appropriate key for decrypting the data, a brute force attack might be launched. In such an attack, all possible letter and number combinations in the chip are tested one after the other. But given the huge number of key combinations and a maximum transmission rate between the PC and the chip of 100 Mbps (Ethernet port), a brute force attack of this kind would require an average of 45000 years in order to succeed. Another type of attack would be to intercept encrypted raw data. Based on the raw data, it might be possible to obtain certain clues regarding the key, and thus to gain access to the raw data. However, with dLAN technology, the encrypted raw data cannot be intercepted from the power circuit, because the chip does not forward encrypted data directly to the network interface. In the chip, the signal is both encrypted and modulated directly, so an attacker would only be able to gain access to the modulated data. However, this is useless to him, because he has no way to back-modulate the signal.

dLAN devices from devolo meet the stringent EU industrial standards and comply with the current standards for electromagnetic radiation.

1.2 What does the dLAN 200 AVpro2 have to offer?

Powerful and flexible

The dLAN 200 AVpro2 offers a transfer rate of up to 200 Mbps which makes it ideal for the high requirements of applications, such as HDTV streaming, Internet telephony and fast Internet.

In particular, the use of dLAN 200 AVpro2 offers the following applications and advantages:

- Connection of computers and other network devices to a dLAN 200 AVpro2 network via power or coaxial circuits
- Shared use of network resources
  - Files and applications
  - Peripherals such as printers, etc.
  - Centralized Internet access

- Sufficient bandwidth for high-requirement applications such as data, audio, and video
- Provision of digital services such as Internet telephony (Voice over IP—VoIP) to many points in the building
- Integration of multimedia devices such as set-top boxes etc. in the dLAN 200 AVpro2 network
- Reduced requirement for long network cables
- Ethernet port with Auto MDI/X for automatic detection of network speed and contact seizure
- Powerful, 128-bit AES encryption to protect transmitted data from unauthorized access
- Transmission of data over greater distances (200 meters in the power supply grid, 750 meters or more in the coaxial network)
- Cost-effective, reliable solution for "high-speed" communication

Application examples of possible networks can be found in chapter 'All about the network'.

Simple installation

- Connect the dLAN 200 AVpro2 to the computer or the network device using the Ethernet cable provided.
- Connect the dLAN 200 AVpro2 to the power supply grid using the power adapter cable provided.
- In order to use the power supply grid as the transmission medium:
  Set the switch to "Hybrid".
- To use the coaxial network as the transmission medium:
  Connect the dLAN 200 AVpro2 to the coaxial connector with the coaxial cable provided for this purpose. Set the switch to "Coax".
- Install the devolo software
- That's it!

2 Connection and Startup

This chapter covers the connectors and display elements of your dLAN 200 AVpro2 and explains how to connect the device.

2.1 Package contents

Please ensure that the delivery is complete before beginning with the installation of your dLAN 200 AVpro:

- dLAN 200 AVpro
- Network cable
- Ethernet cable
- Coaxial cable
- Coaxial adapter
- Printed information leaflet
- CD containing software and online documentation

devolo AG reserves the right to change the package contents without prior notice.

2.2 System requirements

- **Operating systems**: Windows 2000, Windows XP (32 bit), Windows Vista (32 bit) and any other operating system with network support
- **Ethernet connection**

Please note that your computer or other device must feature a network adapter with an Ethernet port.

To set up a dLAN 200 AVpro2 network, you need at least two dLAN 200 AVpro2 devices.

dLAN 200 AVpro2 type devices are based on the HomePlug AV standard and cannot be used in a shared network with UPA adapters. The two encoding methods are not compatible and cannot occupy the same infrastructure, i.e., if they are operated together on power and/or coaxial circuits, they interfere with each other, preventing transmission of data by either system.

2.3 Connection and display elements

The dLAN 200 AVpro2 features 5 control LEDs as well as an Ethernet, coaxial, and a power connection:

2.3.1 Power and dLAN Link/Act

The activity of the **Power** and **dLAN Link/Act** LEDs depends on the configuration mode of your dLAN 200 AVpro2 (Peer isolation—Off/Slave/Master, see also 'Encrypting the dLAN 200 AVpro2 network'):

Peer isolation—Off

Power	Lit steady when the dLAN 200 AVpro2 is operational.
dLAN Link/Act	Lit steady when a connection with the dLAN 200 AVpro2 network exists; flashes when data is being sent or received via the power or coaxial circuits.

Peer isolation—Slave

Power	Lit steady when the dLAN 200 AVpro2 is operational.
dLAN Link/Act	Flashes at > 10-second intervals.

Peer isolation—Master

Power	Flashes when the dLAN 200 AVpro2 is operational; subsequently lit continuously.
dLAN Link/Act	Lit (long) and flashes (short), when one slave has been found; remains lit continuously as soon as a second slave is added.

2.3.2 Ethernet LEDs

ETH 100/Act	Lit steady when a 100 Mbps connection to the Ethernet network exists; flashes when data is being transmitted.
ETH 10/Act	Lit steady when a 10 Mbps connection to the Ethernet network exists; flashes when data is being transmitted.
ETH Col	Flashes at a faster rate if the network is experiencing increasing use.

2.3.3 Ports

ETH	This is the connection point on the dLAN 200 AVpro2 for connecting it to a computer or another device with the network cable (included). The Auto-MDI(X) interface in the dLAN 200 AVpro2 automatically detects when a contact is seized and determines the transmission rate of the connected network device.
Coax	Here you connect the dLAN 200 AVpro2 to the coaxial connector using the coaxial cable supplied.
Coax/PLC	The switch must have been set to **"PLC"** to allow transmission across the **power supply grid**. The switch must have been set to **"Coax"** to allow transmission across the **coaxial network**.
AC	Here you connect the dLAN 200 AVpro2 to the power supply using the power cable (included).

2.4 Connecting the dLAN 200 AVpro2

In this section, we will show you how to connect and start the dLAN 200 AVpro2.

① Use the included AC adapter cable to connect the dLAN 200 AVpro2 to a power supply grid.

② Use the supplied Ethernet cable to connect the dLAN 200 AVpro2 to the Ethernet connector on the computer that is switched on.

③ Select the transmission medium:

- ○ To use the power supply grid as the transmission medium:
  The switch on the back of the device must have been set to "Hybrid" to allow transmission across the power supply grid.
- ○ To use the coaxial network as the transmission medium:
  Connect the dLAN 200 AVpro2 to the coaxial connector with the coaxial cable provided for this purpose.
  The switch on the back of the device must have been set to "Coax" to allow transmission across the coaxial network.

④ Continue with the installation of the devolo software.

2.5 Installation of devolo software

2.5.1 devolo dLAN 200 AVpro manager for Windows

The installation wizard installs the **devolo dLAN 200 AVpro manager** configuration software as well as the **associated manual** on the Windows operating system.

- **devolo dLAN 200 AVpro manager** encrypts your dLAN network individually and thus secures it against unauthorised access.

To install the software, insert the included CD-ROM in the CD drive of your computer. During the installation process, you will be given the choice of installing all software components ('Standard installation') or selecting individual ones ('Custom installation'). After installation is complete you will find the installed **devolo dLAN 200 AVpro manager** as well as the **associated manual** in the program group **Start ▶ All Programs ▶ devolo**.

For detailed descriptions and information on configuration of your dLAN network please consult this ***devolo dLAN 200 AVpro manager manual.***

3 All about the network

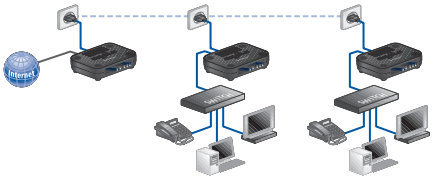
This chapter presents networking options that will illustrate the advantages of dLAN 200 AVpro2 devices.

The dLAN 200 AVpro2 devices transmit in the frequency band between 2 and 30 MHz. If the devices are being operated in a coaxial network that is not exclusively available for data transmission by dLAN 200 AVpro2 devices, a check must be made to determine whether existing television transmission frequencies experience interference. If interference does occur, please refer to the section 'Use of coaxial filters'.

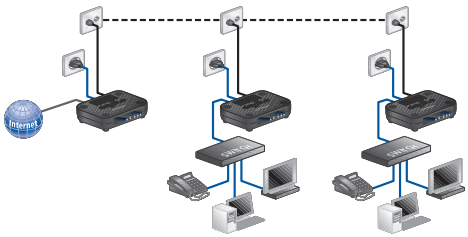
3.1 Networking and Internet access

dLAN 200 AVpro2 devices are used to connect network devices such as computers, routers, switches, IP telephones, set-top boxes etc. in a network using the existing power and coaxial cables.

Data transmission over power supply grid



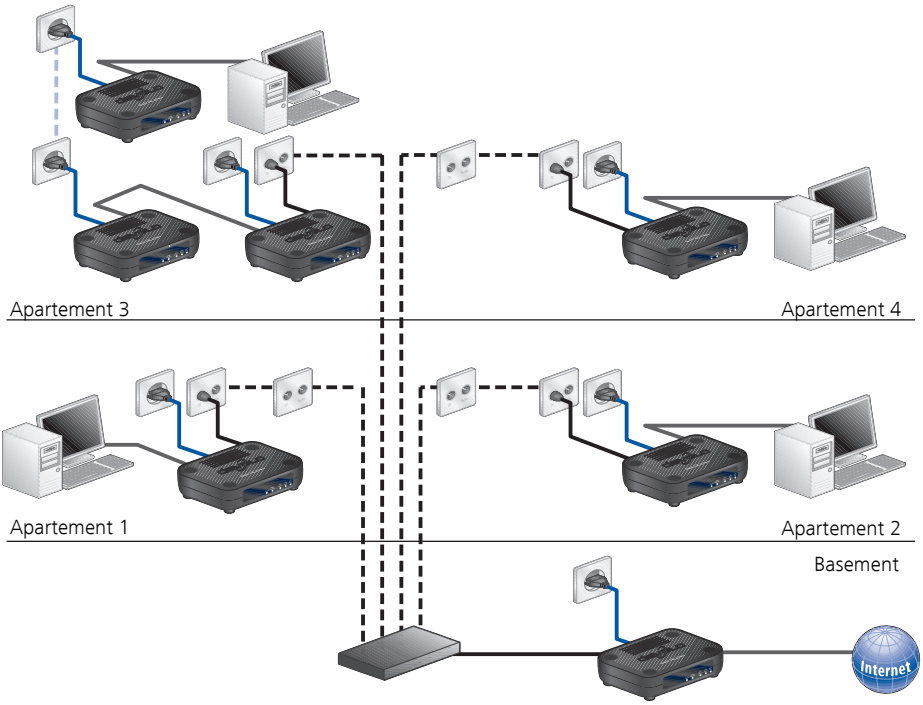
Data transmission over coaxial network



3.2 Networking a building

dLAN 200 AVpro2 devices are able to make flexible use of the circuits that are already present in the rooms. The dLAN 200 AVpro2 devices can connect all network subscribers over both circuit types even if the conditions within the buil-

ding change, and for example provide central Internet access to all connected network devices.



A repeater, consisting of two devices, can be set up so that both circuit types—power circuit and coaxial circuit—can be used in a data network. To do this, one dLAN 200 AVpro2 for transmitting data over the power circuit, and one dLAN 200 AVpro2 for transmitting over the coaxial circuit are connected directly via an Ethernet cable (see Figure Apartment 3).

3.3 Use of coaxial filters

The transmission frequency of the wanted signal across coaxial circuits is between 2 and 30 MHz. It can happen that interference is emitted above this frequency range, which may interfere with the wanted signals of other applications. In this case, it is advisable to use a filter.

It is recommended to use a filter to decouple the dLAN 200 AVpro2 signals from the transfer point of the TV signal. A filter should be used

- when you want to isolate your dLAN 200 AVpro2 network from the rest of the coax infrastructure, or to prevent the dLAN 200 AVpro2 signal from interfering with other devices that are not included in your network.
- when you want to shield your dLAN 200 AVpro2 network from interference by other transmissions in the same frequency range.
- when you want to protect your dLAN 200 AVpro2 network from interference by a Docsis modem (or other cable modem) In this case, install a filter between the cable modem and the dLAN 200 AVpro2 network.

For more answers to frequently asked questions (FAQs), please visit our website at www.devolo.com.

4 Appendix

4.1 Technical specifications

For **technical specifications** of the dLAN 200 AVpro2, please see our product sheet on the included product CD.

4.2 Important safety instructions

It is essential to have read and understood all safety and operating instructions before the device is used for the first time; these should then be kept safely for future reference.

- Do not open the device. There are no user-serviceable parts inside the device.

Do not attempt to service the product yourself, call on qualified technicians for assistance with all service tasks! There is a danger of electric shock!

- Use the device only in a dry location.
- Do not insert any objects in the openings in the device.
- To disconnect the device from the power supply grid, pull out the plug.
- Do not expose the device to direct sunlight.
- Slits and apertures in the case are intended to provide ventilation and must not be blocked or covered.
- The device must not be set up in close proximity to a radiator.
- The device should only be set up in locations where adequate ventilation is assured in accordance with the manufacturer's instructions.
- Disconnect the device from the power supply grid before cleaning. Never use water, paint thinner, benzene, alcohol or other strong cleaning agents when cleaning the device, as these could damage the case. Only use a slightly moist soft cloth.
- The device should be operated exclusively on a public power supply as described on the rating plate. If you are not sure which kind of power supply you have at home, contact your dealer or your utility company.
- If the equipment is damaged, disconnect the device from the mains and contact your after-sales service representative. Damage is deemed to have occurred
  - if the power cable or plug is damaged
  - if the device is sprayed with liquid or if objects have got inside the device

- if the device has been exposed to rain or water
- if the device does not work, despite the fact that all operating instructions have been followed properly
- if the case of the device has been damaged.

- Class A products may cause interference when used in residential environments.

4.3 CE conformity

The product conforms to the basic requirements of Directive 1999/5/EC (R&TTE) and the other relevant provisions of the FTEG (Radio and Telecommunications Terminal Equipment Act), and is designed for use in the EU and Switzerland.

This product is class A equipment. This equipment may cause interference with radio waves in home use; if this occurs the operator may be required to take corrective action.

4.3.1 Declaration of conformity

CE

KONFORMITÄTSERKLÄRUNG

DECLARATION OF CONFORMITY

Hersteller: Manufacturer:	**devolo AG** **Sonnenweg 11** **52070 Aachen**
Produkt: Product:	**devolo dLAN®200 AVpro2**
Typnummer: Type number:	**MT2131**
Verwendungszweck: Intended purpose:	**PLC, Coax zu Ethernet Adapter** PLC, Coax to Ethernet Adapter
Richtlinie: Directive:	**EMV 2004/108/EG** EMC 2004/108/EC

Das Produkt entspricht den grundlegenden Anforderungen und Bestimmungen der folgenden Normen und Methoden:
The product complies with the essential requirements and provisions of following standards and methods:

Sicherheitsanforderungen: Safety requirements:	**EN 60950-1:2001**
Immunitätsanforderungen: Immunity requirements:	**EN 55024:1998+A1:2001+A2:2003**
Emissionsanforderungen: Emission requirements:	**EN 55022:1998+A1:2000+A2:2003 (Class A)** **und Expert Opinion vom Competent Body EMV** and Expert Opinion by Competent Body EMC

Diese Erklärung wird verantwortlich abgegeben durch:
This declaration is submitted by:

Aachen, 07. November 2007
Aachen, 7th November 2007

Heiko Harbers
Vorstandsvorsitzender
CEO

4.4 Warranty conditions

The devolo AG warranty is given to purchasers of devolo products in addition to the warranty conditions provided by law and in accordance with the following conditions:

1 Warranty coverage

a) The warranty covers the equipment delivered and all its parts. Parts will, at devolo's sole discretion, be replaced or repaired free of charge if, despite proven proper handling and adherence to the operating instructions, these parts became defective due to fabrication and/or material defects. Alternatively, devolo reserves the right to replace the defective product with a comparable product with the same specifications and features. Operating manuals and any supplied software are excluded from the warranty.

b) Material and service charges shall be covered by devolo, but not shipping and handling costs involved in transport from the buyer to the service station and/or to devolo.

c) Replaced parts become property of devolo.

d) devolo is authorized to carry out technical changes (e.g. firmware updates) beyond repair and replacement of defective parts in order to bring the equipment up to the current technical state. This does not result in any additional charge for the customer. A legal claim to this service does not exist.

2 Warranty period

The warranty period for this devolo product is three years. This period begins at the day of delivery from the devolo dealer. Warranty services rendered by devolo do not result in an extension of the warranty period nor do they initiate a new warranty period. The warranty period for installed replacement parts ends with the warranty period of the device as a whole.

3 Warranty procedure

a) If defects appear during the warranty period, the warranty claims must be made immediately, at the latest within a period of 7 days.

b) In the case of any externally visible damage arising from transport (e.g. damage to the case), the person responsible for the transportation and the sender should be informed immediately. On discovery of damage which is not externally visible, the transport company and devolo are to be immediately informed in writing, at the latest within 3 days of delivery.

c) Transport to and from the location where the warranty claim is accepted and/or the repaired device is exchanged, is at the purchaser's own risk and cost.

d) Warranty claims are only valid if a copy of the original purchase receipt is returned with the device. devolo reserves the right to require the submission of the original purchase receipt.

4 Suspension of the warranty

All warranty claims will be deemed invalid if

a) the label with the serial number has been removed from the device,

b) the device is damaged or destroyed as a result of acts of nature or by environmental influences (moisture, electric shock, dust, etc.),

c) the device was stored or operated under conditions not in compliance with the technical specifications,

d) the damage occurred due to incorrect handling, especially due to non-observance of the system description and the operating instructions,

e) the device was opened, repaired or modified by persons not authorized by devolo,

f) the device shows any kind of mechanical damage,

g) the warranty claim has not been reported in accordance with 3a) or 3b).

5 Operating mistakes

If it becomes apparent that the reported malfunction of the device has been caused by unsuitable software, hardware, installation or operation, devolo reserves the right to charge the purchaser for the resulting testing costs.

6 Additional regulations

a) The above conditions define the complete scope of devolo's legal liability.

b) The warranty gives no entitlement to additional claims, such as any refund in full or in part. Compensation claims, regardless of the legal basis, are excluded. This does not apply if e.g. injury to persons or damage to private property are specifically covered by the product liability law, or in cases of intentional act or culpable negligence.

c) Claims for compensation of lost profits, indirect or consequential detriments, are excluded.

d) devolo is not liable for lost data or retrieval of lost data in cases of slight and ordinary negligence.

e) In the case that the intentional or culpable negligence of devolo employees has caused a loss of data, devolo will be liable for those costs typical to the recovery of data where periodic security data back-ups have been made.

f) The warranty is valid only for the first purchaser and is not transferable.

g) The court of jurisdiction is located in Aachen, Germany in the case that the purchaser is a merchant. If the purchaser does not have a court of jurisdiction in the Federal Republic of Germany or if he moves his domicile out of Germany after conclusion of the contract, devolo's court of jurisdiction applies. This is also applicable if the purchaser's domicile is not known at the time of institution of proceedings.

h) The law of the Federal Republic of Germany is applicable. The UN commercial law does not apply to dealings between devolo and the purchaser.

5 Troubleshooting

The dLAN 200 AVpro2 has been intentionally designed to be as reliable and easy to operate as possible. This chapter includes a few notes that are designed to help you locate the possible fault in the event of a malfunction.

The Power LED does not light up.

① Check that the power cable is connected properly to the power connector on the device.

② Make sure that the device is connected directly to a socket, and that the socket is live.

③ Try using a different socket.

The dLAN Link/Act LED does not light up.

① Make sure that there is not an analog TV amplifier or too many T-splitters between the dLAN 200 AVpro2 devices that should be communicating with each other.

② Try connecting two dLAN 200 AVpro2 devices with a short coaxial cable to carry out a quick connectivity test.

The Ethernet LED does not light up.

① Make sure that the dLAN 200 AVpro2 is connected to a device with an Ethernet port by an RJ-45 cable, and that both devices are switched on.